

Notes on Marsdenieae (Asclepiadaceae)—A New, Unusual Species of *Hoya* from Northern Borneo

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ABSTRACT. *Hoya telosmoides* R. Omlor sp. nov. from northern Borneo is described and illustrated. Its systematic position is discussed, and an introduction is given to the major subgroups of the Marsdenieae and their delimitation.

The following description of a new species of *Hoya* R. Brown has resulted from my work on a generic revision of the tribe Marsdenieae in Asclepiadaceae. Since the attribution of this new species to the genus *Hoya* is not self-evident, and since at present there is no consensus as to how most genera of the tribe are to be defined, it is necessary to give a short introduction on the delimitation and the major subgroups of the Marsdenieae.

In a broad taxonomic sense the Marsdenieae comprise some 500 species in about 60 genera (a list of all validly published generic names can be found in Liede & Albers (1994)), which are distributed throughout the tropical and subtropical regions of the world. The taxonomic delimitation of the group is difficult and the tribal concept—as well as the tribal name—has been subject to repeated change (e.g., Endlicher, 1838; Decaisne, 1844; Bentham, 1868, 1876; Schumann, 1895). At present the Marsdenieae are circumscribed within subfamily Asclepiadoideae by longitudinal dehiscence of the thecae, erect or ascending pollinia, and anthers with membranous terminal appendages (Bruyns & Forster, 1991). With exception of the membranous anther appendages these characters also apply to the Stapelieae, but the latter can be distinguished by the pellucid germination zone on the apex or the inner side of their pollinia, (Bruyns & Forster, 1991). Delimited by this differentiation of the pollinia, the Stapelieae sensu Bruyns & Forster are almost certainly a monophyletic group. In sharp contrast, the Marsdenieae cannot be defined by synapomorphies; instead, they have always been a conglomeration of several generic groups that do not necessarily belong together. Since the last complete generic revision of the Marsdenieae (Schumann, 1895) about 37 new generic names have been attributed to the tribe and a number of genera

have been transferred from the Marsdenieae to other tribes:

The delimitation of the Stapelieae by means of the pellucid germination zone on the apex or inner side of the pollinia resulted in the transfer of *Tenaris* E. Meyer (Brown, 1902), *Heterostemma* Wight & Arnott (Schill & Jäkel, 1978; Bruyns & Forster, 1991), *Pentasachme* Wallich (Bruyns & Forster, 1991), and *Swynnertonia* S. Moore (Liede & Albers, 1994) from the Marsdenieae to the Stapelieae. For the same reason the genus *Emplectanthus* N. E. Brown should also be transferred to the Stapelieae. The minute pollinia of this genus have an apical germination mouth, and the corona consists of staminal lobes and additional interstaminal, pouch-like segments. Terminal anther appendages are lacking. N. E. Brown (1902) already described these characters, but placed the genus in the Marsdenieae because it resembles some species of *Tylophora* R. Brown in habit very closely. Brown (1902) argued that *Emplectanthus* might be a generic hybrid between *Tylophora* and *Riocreuxia* Decaisne, but there is no evidence for this hypothesis.

The genera *Rhynchostigma* Bentham (Brown, 1902) and *Trichosandra* Decaisne (Friedmann, 1990) were transferred from the Marsdenieae to the Secamoneae in subfamily Secamonoideae.

Only recently Kunze et al. (1994) pointed out the isolated position of *Fockea* Endlicher and *Cibirhiza* Bruyns within the Marsdenieae and established the new tribe Fockeeae to accommodate them. Both genera are distinguished from the Marsdenieae by their sometimes large tuberous rootstock, by the complexity of their corona, and by the primitive state of their translator to which the pollinia are directly attached, instead of being linked via caudicles as is the case in all other members of the Asclepiadoideae (Kunze, 1993). An important deviation from Asclepiadoideae not mentioned by Kunze et al. (1994) is that in *Fockea* and *Cibirhiza* the pollinia are composed of rhomboidal and T-shaped pollen tetrads. In this respect the Fockeeae agree with the Periplocaceae and Secamonoideae (commonly regarded as the most primitive groups

of Asclepiadaceae s.l.), whereas the Asclepiadoideae generally are characterized by linear pollen tetrads as the result of two successive meiotic divisions (Safwat, 1962). This observation substantiates the hypothesis of Kunze et al. (1994) that the Fockeeae represent the most primitive group within the Asclepiadoideae.

Despite all these rearrangements, the Marsdenieae still include some genera that do not fit comfortably within the tribe. The reason for this lies in the vague delimitation from the Asclepiadeae, which is entirely based on the orientation of the pollinia: "erect or horizontal" in Marsdenieae versus "pendulous" in Asclepiadeae (Bruyns & Forster, 1991). The pendulous position of the pollinia is generally regarded as the apomorphic state (e.g., Wanntorp, 1988: 21), but the transition from erect to pendulous pollinia may have occurred several times in the evolution of Asclepiadoideae. Apart from the Gonolobeae, which are probably derived from the Asclepiadeae, almost all genera with an intermediate condition (i.e., caudicles attached laterally in the middle part of the pollinia) or with variable orientation of the pollinia have been attributed to the Marsdenieae. These "intermediate genera" fall into two apparently unrelated groups, namely the *Tylophora* group in the Old World, and a group of New World genera at least consisting of *Barjonia* Decaisne, *Nephradenia* Decaisne, *Jobinia* Fournier, and *Vailia* Rusby. Though crucial for an understanding of the phylogeny of Asclepiadoideae, the affinities of all these "intermediate genera" are poorly understood.

If these "intermediate genera" are left aside, eventually the "natural core" of Marsdenieae remains. It is primarily a group of woody perennial lianas or twining shrubs with simple staminal coronas (rarely a corolline corona), undifferentiated, erect, elongated pollinia, and flattened, comose, sometimes broadly margined, smooth seeds. Representatives of this basal type of Marsdenieae are found throughout the warmer regions of the world. A second, more advanced group is confined to southern Asia, Malesia, and Australia. This group mainly consists of herbaceous vines or climbing or dependent epiphytes with often fleshy leaves and persistent inflorescences that produce flowers for several seasons. The corona lobes in this group are staminal, often horizontally spreading, and generally consisting of an inner tip that is appressed to the anthers and a variable outer part with revolute lateral margins. The seeds are comose, spindle-shaped, and lack differentiated margins, and the pollinia—this is the most significant deviation from the rest of the Marsdenieae—have a conspicuous,

pellucid germination zone on their outer margin (Schill & Dannenbaum, 1984).

The most prominent representative of this sharply distinguished group is the genus *Hoya*; in the following sections I will refer to these "derived" Marsdenieae informally as the "*Hoya* group." Besides the large genus *Hoya*, which is here understood in the broad taxonomic sense circumscribed by Forster and Liddle (1990) (thus including *Physostelma* Wight and *Cyrtoceras* Bennett), the group further comprises *Absolmsia spartioides* (Bentham) Kuntze, a highly specialized epiphytic subshrub from Borneo (see Gilbert et al., 1995: 14), and in my view *Micholitzia obcordata* N. E. Brown, which was recently reviewed by Goyder and Kent (1994). The monotypic, little known Malesian genera *Orcosparte* Schlechter and *Heynella* Backer might also belong here, but this still has to be confirmed.

Although clearly differentiated from the rest of the Marsdenieae, the *Hoya* group is not equal in rank to the Stapelieae. Whereas all the important characters of the Stapelieae (pollinia with apical germination mouth, corona consisting of staminal and interstaminal segments, succulent stems, lack of membranous anther appendages) do not occur in the Marsdenieae, the characters which in combination distinguish the *Hoya* group can individually be found—to varying degree and in various states—in other Marsdenieae too:

Epiphytic life form, herbaceous growth, fleshy leaves, and spindle-shaped, unmarginated seeds are also characteristic of the genus *Dischidia* R. Brown and its segregates. With regard to floral characters, however, the *Dischidias* are not fundamentally different from the "basal" Marsdenieae (e.g., *Marsdenia tinctoria* R. Brown).

Persistent, racemiform contracted inflorescences occur in several Southeast Asian Marsdenieae (e.g., *Dischidanthus urceolatus* (Decaisne) Tsiang, *Gongronema wallichii* Decaisne, *Thozetia racemosa* F. Mueller ex Bentham, *Clemensiella mariae* (Schlechter) Schlechter, and probably all *Dischidia* species).

Resemblances to the floral characters that most sharply distinguish the *Hoya* group can be recognized in the genus *Telosma* Coville. In many, if not all, *Telosma* species the outer margin in the lower half of the pollinia is strongly flattened (sometimes even pellucid) and generally curved forward (toward the anthers). This type of pollinia can be regarded as intermediate between the undifferentiated pollinia of all other "basal" Marsdenieae and the derived pollinia of the *Hoya* group. Apart from the pollinia, there also are similarities concerning the construction of the staminal corona. In *Telosma*

the corona consists of laminar lobes, which adaxially bear a filiform appendage (Liede & Kunze, 1993: fig 2A). From this model the complex corona of the *Hoya* group can easily be derived by the recurvation of the lateral margins of the laminar segment and the shift in its orientation from erect to horizontal.

Concerning its vegetative characters, however, *Telosma* is exceedingly different from the members of the *Hoya* group. The *Telosma* species all are woody climbers with thin, cordate leaves, salver-shaped flowers, and flattened, broadly margined seeds. With respect to these characters a close relationship between these plants and the *Hoya* group appears rather unlikely. Their vague similarities with the *Hoya* group would perhaps deserve no attention, were there not a *Hoya* species with a *Telosma*-like corolla.

Hoya telosmoides R. Omlor, sp. nov. TYPE: Malaysia. Sabah: Mt. Kinabalu, Tenompok, 1500 m, 7 June 1932, Clemens 29828 (holotype, BM; isotype, K). Figures 1, 2.

Ab omnibus speciebus *Hoyarum* adhuc cognitiss corolla tubo urceolato intus villosa, fauce contracta, segmentis patentibus linearibus-triangularibus recedit.

Herbaceous glabrous vine. Stems twining, cylindrical, about 3 mm diam.; internodes 8–25 cm long. Leaves opposite, petiolate; lamina narrowly elliptic or elliptic-oblongate, shining, (80–)100–130 × (25–)30–55 mm, coriaceous, apex acuminate or attenuate, base acute or cuneate, with a pair of glands at least when young, margin slightly revolute, the midrib clearly elevated on the lower surface, secondary venation less conspicuous, consisting of 4–7 brochidodromous veins branching from the midrib at a wide acute or an almost right angle; petiole 8–13 mm long. Inflorescences occurring singly at the nodes, clearly interpetiolar, long pedunculate (40–55 mm), pendulous, umbelliform with up to ca. 18 flowers, persistent, rachis with scars of previous flowers; pedicels 15–20 mm long, glabrous. Flowers 10–15 mm long, up to 20 mm diam. Sepals lanceolate-ovate, 2 × 0.8 mm, apex rounded, alternating with single glands, glabrous. Corolla fleshy, having an inflated tube that is slightly constricted at its top, and bearing five narrowly triangular, erect or slightly spreading lobes, outside glabrous, pale yellow tinged with purple; corolla tube 5.5–6.5 mm long, inside densely covered with long unicellular, recurved trichomes, at its base bulged between the calyx lobes, the throat narrowed (almost segmented) by infolds below the sinuses of the petals; free corolla lobes up to 10 mm long, glabrous, margins

slightly recurved. Gynostegium ca. 4.5 mm high, almost completely filling the corolla tube. Corona staminal, fleshy, slightly spreading, about as high as the sterile part of the stamens; corona lobes connate with the back of the stamens, adaxially elongated into a free, ovate tip about 0.4 mm long which is appressed to the stamens, lobes laterally compressed, abaxially broadened into a massive erect process with revolute lateral margins and truncate apex; the corona lobes with a finely striated, hard surface. Anthers erect, terminated by an ovate hyaline appendage, ca. 1.5 mm long, with rounded or retuse-bilobed apex. Pollinia erect, oblong-obovate, compressed, 0.7 × 0.3 mm, with a lateral “pellucid margin.” Corpusculum 0.45 × 0.28 mm. Carpels glabrous, style head with short conical appendage, not exceeding the anthers. Fruits and seeds unknown.

Because of its unusual corolla *Hoya telosmoides* does not at first sight look like a true *Hoya*. Instead it might be taken for a *Dischidia* or a *Telosma* species, or for a near relative of *Gongronema filipes* Kerr, which superficially resembles it very closely. However, the herbaceous growth, the fleshy elliptic leaves, and the umbelliform inflorescence with scars of previous flowers indicate a relationship with the *Hoya* group. This is fully confirmed by the floral characters. The gynostegium (Fig. 1C), though superficially similar to that of *Gongronema filipes* Kerr or *Gongronema wallichii* Decaisne, reveals all the typical characters of the *Hoya* group: The corona is solid, with a finely striated surface, and the abaxial lobes have revolute lateral margins (Fig. 1D). In the older literature the last character often is simply described as “corona lobes dorsally sulcate.” However, very many corona lobes are “sulcate,” at least in their basal part; the crucial point is whether the furrow results from revolute margins, as this serves to distinguish the *Hoya* group from other Marsdenieae.

Together with the peculiar construction of the corona lobes, the shape of the pollinarium (Fig. 1A) unequivocally places this new species in the *Hoya* group. Elongated, compressed pollinia with the characteristic germination zone along the entire outer margin do not occur elsewhere in the Marsdenieae (see above), and the shape of the corpusculum with the caudicles attached in the middle part likewise is typical of the *Hoya* group.

While the incorporation of the new species in the *Hoya* group is thereby strongly supported, its affinities within that group are much more difficult to assess. A modern, complete revision of *Hoya*, which probably comprises over 100 species, is not avail-

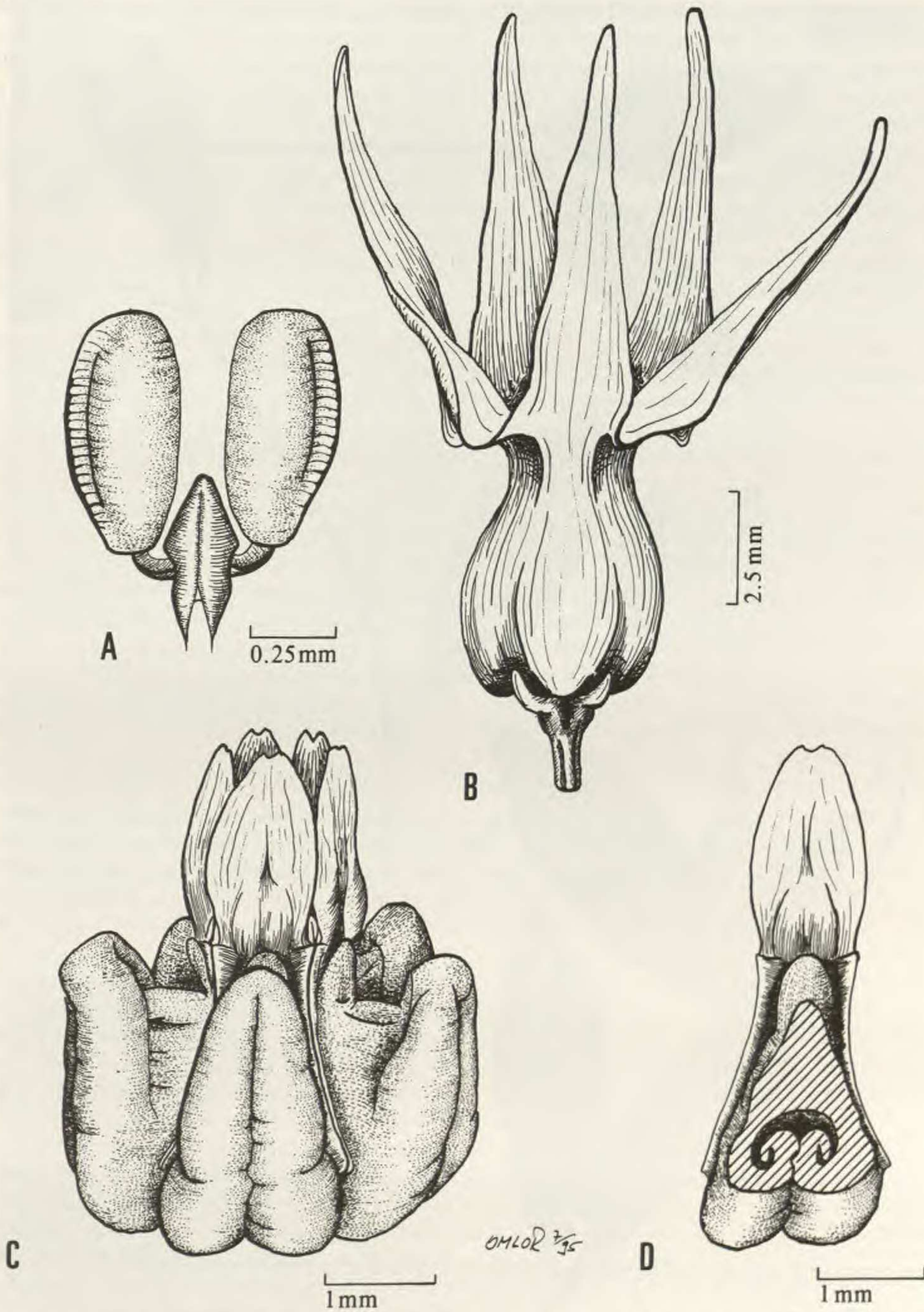


Figure 1. *Hoya telosmoides* R. Omlor. —A. Pollinarium. —B. Flower. —C. Gynostegium. —D. Dorsal view of a stamen, corona lobe sectioned to illustrate the revolute margins. All drawn from *Clemens 30259*.



Figure 2. Holotype of *Hoya telosmoides* (Clemens 29828 (BM)).

able, and neither the delimitation nor the infrageneric classification of the genus has yet been satisfactorily resolved. Important recent contributions to the taxonomy of *Hoya* are provided by Rintz's (1978) revision of the Malaysian species and by Forster and Liddle's (1990) treatment of the Australian species. In both accounts *Hoya* is treated in a broad taxonomic sense, including the somewhat deviating *Physostelma* Wight (= *Hoya campanulata* Blume group) and *Cyrtoceras* Bennett (= *Hoya multiflora* Blume).

In this broad taxonomic sense the genus *Hoya* shows a wide variation in floral characters: Whereas most species of the genus have flowers with a deeply lobed rotate, often reflexed corolla, a few species, e.g., *H. campanulata* Blume, have broad-campanulate flowers. A small number of species are exceptional in having pollinia lacking the typical germination zone otherwise characteristic of the *Hoya* group. These are *H. mitrata* Kerr (Rintz, 1978) and a group of species—such as *H. coronaria* Blume (Rintz, 1978: 505) or *H. lauterbachii* Schumann (Forster & Liddle, 1990: 220)—which Schlechter (1914) united in his section *Eriostemma*. *Hoya pusilla* Rintz differs by atypical corona lobes that lack the characteristic revolute margins. These are only a few, notable examples for *Hoya* species with deviating characters. Rintz (1978) described in detail the morphological variation present in *Hoya*.

If the genus *Hoya* is accepted in the broad taxonomic sense circumscribed by Forster and Liddle (1990), the new species presented here can casually be ascribed to it. Although differing by the shape of its corolla from all hitherto known species of *Hoya*, *H. telosmoides* entirely agrees in the remaining diagnostic characters of the genus. It must be considered that species with campanulate flowers and the above-listed species with more fundamental deviations are (well founded) commonly accepted in *Hoya*. Within *Hoya* the new species occupies an isolated position and should therefore be classified in a separate section.

It has to be mentioned that two monotypic genera of uncertain affinities might be related to *Hoya telosmoides*. One of these, the genus *Oreosparte*, was established by Schlechter (1916) for an exceptional, *Hoya*-like species he had collected in the mountains of Minahassa on Celebes. This species, *Oreosparte celebica* Schlechter, is described as having a campanulate, inside minutely pubescent corolla tube with a contracted throat and lanceolate, spreading lobes. Apparently *Oreosparte* concurs with *Hoya telosmoides* in shape of the corolla, but it is described as having a stalked gynostegium and a corona similar in shape to the corona of *Hoya*

multiflora. I have been unable to locate any material of *Oreosparte celebica*. The holotype (Schlechter 20512) was apparently destroyed along with the major part of the Berlin Herbarium in 1943 (Hiepko, 1978; Nicholas, 1992). From Schlechter's Asclepiadaceae collection at B only a few *Hoya* and *Dischidia* specimens remained (Hiepko, pers. comm.). However, the plant must have been rather common in the mountains of Minahassa, since Schlechter (1916) reported that its filiform stems have been used to bundle the collections during the expedition. Therefore it may be assumed that duplicates had been collected and distributed to other herbaria. It would be appreciated if any information concerning the existence of such isotypes were to be communicated to the author.

The second monotypic genus that might be related to *Hoya telosmoides* is *Heynella* Backer from Java. *Heynella lactea* Backer, according to the description, is characterized by a salver-shaped corolla with a flask-shaped tube, and ovate-oblong, slightly spreading lobes (Bakhuizen, 1950). It is distinguished from *Hoya telosmoides* by its epiphytic nonclimbing habit and by terminal inflorescences (a rather doubtful observation). Furthermore, in contrast to *Hoya telosmoides* the free lobes of the corolla are considerably shorter than the corolla tube. Unfortunately, the type material of *Heynella lactea*, located at BO, Indonesia (Forster & Liddle, 1994), could not be sent on loan for study.

Neither in the case of *Oreosparte* nor in *Heynella* can it be judged from the protologue whether the pollinia have the lateral pellucid germination zone and whether the corona lobes exhibit the characteristic revolute margins. For the time being, the taxonomic position of these genera within the Marsdenieae must therefore remain uncertain.

At present *Hoya telosmoides* is known only from two areas in northern Borneo, where it is found twining in lower and upper stories of mountain forest, at altitudes of 800–1500 m.

Paratypes. MALAYSIA. **Sabah:** Mt. Kinabalu, Tenompok, 1500 m, 15 June 1932, Clemens 30259 (K); Mt. Kinabalu, Penibukan, 1200–1500 m, 10 Jan. 1933, top of 80 ft. tree, Clemens 30868 (BM). **Sarawak:** Gunong Api, ulu Melinau, Tutoh, Baram District, NE flank of mountain, 4°07'N, 115°15'E, 880 m, 30 Sep. 1971, "small climber in understorey, inflorescence pendulous, corolla pale yellow, waxy, corona sunk, anthers reddish brown," Anderson 30815 (K).

Acknowledgments. The present contribution resulted from my ongoing work on a generic revision of Marsdenieae and is based on the examination of herbarium material of some 200 species borrowed mainly from B, BM, HBG, K, M, and P after ex-

tensive study of their collections; individual specimens have been provided by IBSC, L, and US. A list of the specimens examined is available upon request. I am indebted to the directors of the cited herbaria for permission to study their collections and for sending specimens on loan. Furthermore, I express my gratitude to Herbert Huber, under whose guidance this work was done. My sincerest thanks also go to David J. Goyder for valuable discussions and suggestions, to Wolfgang Stuppy for critically reading the manuscript, and to Andreas Stern for taking the photograph of the holotype. This work was supported by a grant from the LGFG-Kommission Rheinland-Pfalz.

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